

IN THE CLAIMS:

Please amend the pending reissue application claims as follows:

1. (Original Patent Claim) A method of discriminating toner bottle types, comprising:
the object sensing step of rotating a toner bottle, sensing an object to be sensed formed on an outer surface of said toner bottle and, if said object is not sensed, outputting information indicating abnormality; and

the ratio discrimination step of checking, if said object is sensed, whether said object is formed at a predetermined ratio on the outer surface of said toner bottle, outputting information indicating abnormality if said object is not formed at the predetermined ratio, and outputting information indicating normality if said object is formed at the predetermined ratio.

2. (Original Patent Claim) A method according to claim 1, wherein the object ratio discrimination step comprises the steps of:

detecting a first time interval from the timing at which said sensor senses one end portion of said object of said toner bottle in rotation to the timing at which said sensor senses the other end portion;

detecting a second time interval from the timing at which said sensor senses the other end portion of said object to the timing at which said sensor senses the one end portion; and

checking whether said object is formed over a predetermined length on the outer surface of said toner bottle by using the first and second time intervals.

3. (Original Patent Claim) A method according to claim 1, wherein the object ratio discrimination step is performed with reference to the timing at which a first end portion of said object of said toner bottle in rotation is sensed and the timing at which a second end portion of said object is sensed.

4. (Original Patent Claim) An apparatus for discriminating toner bottle types, comprising:

a motor for rotating a toner bottle;

a motor driver for driving said motor;

a sensor for sensing an object to be sensed formed in a predetermined portion of said toner bottle and outputting a sensor signal; and

a CPU for controlling said motor driver and discriminating said toner bottle by using the sensor signal,

wherein said CPU rotates said toner bottle by controlling said motor driver, senses said object assumed to be formed on an outer surface of said toner bottle by using said sensor, outputs information indicating abnormality if said object is not sensed,

checks, if said object is sensed, whether said object is formed at a predetermined ratio on the outer surface of said toner bottle, outputs information indicating abnormality if said object is not formed at the predetermined ratio, and outputs information indicating normality if said object is formed at the predetermined ratio.

5. (Original Patent Claim) An apparatus according to claim 4, wherein in order to check whether said object is formed at the predetermined ratio on the outer surface of said toner bottle,

said CPU detects a first time interval from the timing at which said sensor senses one end portion of said object of said toner bottle in rotation to the timing at which said sensor senses the other end portion,

detects a second time interval from the timing at which said sensor senses the other end portion of said object to the timing at which said sensor senses the one end portion, and

checks whether said object is formed at the predetermined ratio on the outer surface of said toner bottle by using the first and second time intervals.

6. (Original Patent Claim) A toner bottle adapted to fit an apparatus for discriminating toner bottle types, wherein

said toner bottle type discriminating apparatus comprises:

a motor for rotating a toner bottle;

a motor driver for driving said motor;

a sensor for sensing an object to be sensed formed in a predetermined portion of said toner bottle and outputting a sensor signal; and

a CPU for controlling said motor driver and discriminating said toner bottle by using the sensor signal, and

said CPU rotates said toner bottle by controlling said motor driver, senses said object assumed to be formed on an outer surface of said toner bottle by using said sensor, outputs information indicating abnormality if said object is not sensed,

 checks, if said object is sensed, whether said object is formed at a predetermined ratio on the outer surface of said toner bottle, outputs information indicating abnormality if said object is not formed at the predetermined ratio, and outputs information indicating normality if said object is formed at the predetermined ratio.

7. (Original Patent Claim) A toner bottle according to claim 6, wherein in order to check whether said object is formed at the predetermined ratio on the outer surface of said toner bottle,

 said CPU detects a first time interval from the timing at which said sensor senses one end portion of said object of said toner bottle in rotation to the timing at which said sensor senses the other end portion,

 detects a second time interval from the timing at which said sensor senses the other end portion of said object to the timing at which said sensor senses the one end portion, and

 checks whether said object is formed at the predetermined ratio on the outer surface of said toner bottle by using the first and second time intervals.

8. (Original Patent Claim) A method of stirring toner and discriminating toner bottle types, comprising the steps of:

 rotating a toner bottle through a predetermined angle in a forward direction, sensing an object to be sensed assumed to be formed on an outer surface of said toner bottle and, if said object is not sensed, outputting information indicating abnormality; and

 rotating said toner bottle through a predetermined angle in a reverse direction, sensing said object by using said sensor and, if said object is not sensed, outputting information indicating abnormality,

 wherein toner is stirred by rotating said toner bottle through the predetermined angles in the forward and reverse directions.

9. (Original Patent Claim) An apparatus for stirring toner and discriminating toner bottle types, comprising:

a motor for rotating a toner bottle;
a motor driver for driving said motor;
a sensor for sensing an object to be sensed formed in a predetermined portion of said toner bottle and outputting a sensor signal; and
a CPU for controlling said motor driver and receiving the sensor signal,
wherein said CPU controls said motor driver to rotate said toner bottle through a predetermined angle in a forward direction, senses said object assumed to be formed on an outer surface of said toner bottle by using said sensor, outputs information indicating abnormality if said object is not sensed,
rotates said toner bottle through a predetermined angle in a reverse direction, senses said object by using said sensor, and outputs information indicating abnormality if said object is not sensed.

10. (Original Patent Claim) A toner bottle adapted to fit an apparatus for stirring toner and discriminating toner bottle types, wherein

said toner stirring and toner bottle type discriminating apparatus comprises:

a motor for rotating a toner bottle;
a motor driver for driving said motor;
a sensor for sensing an object to be sensed formed in a predetermined portion of said toner bottle and outputting a sensor signal; and
a CPU for controlling said motor driver and receiving the sensor signal, and
said CPU controls said motor driver to rotate said toner bottle through a predetermined angle in a forward direction, senses said object assumed to be formed on an outer surface of said toner bottle by using said sensor, outputs information indicating abnormality if said object is not sensed,
rotates said toner bottle through a predetermined angle in a reverse direction, senses said object by using said sensor, and outputs information indicating abnormality if said object is not sensed.

Cancel claim 11.

Cancel claim 12.

Cancel claim 13.

14. (Currently Amended) A toner bottle for use with an image forming apparatus to supply toner to the image forming apparatus when the toner bottle is rotated by the image forming apparatus, the image forming apparatus having a sensor that senses the toner bottle, comprising:

an elongated cylindrical bottle body that houses toner, the bottle body having an edge portion and an end portion, the end portion being positioned opposite to the edge portion in an axial direction along the bottle body, and a groove extending around the outer surface of the bottle body and extending between adjacent the edge portion and adjacent the end portion;

a toner discharge port provided on the bottle body adjacent the edge portion, the toner being discharged from the discharge port when the toner moves toward the edge portion during toner bottle rotation; and

a rib having a predetermined length, the rib being provided on the outer surface of the bottle body, the rib adapted to be sensed by the sensor in the image forming apparatus during toner bottle rotation in order to judge whether the rib exists at a predetermined position and extends for a predetermined ratio on the outer surface of the bottle body, to thereby discriminate toner bottle type.

15. (Pending) The toner bottle according to claim 14, wherein the rib extends in a circumferential direction along the outer surface of the bottle body.

16. (Pending) The toner bottle of claim 15, wherein the rib is formed at a predetermined position on the bottle body relative to the toner discharge port, the rib being aligned with the toner discharge port in an axial direction along the bottle body.

17. (Pending) The toner bottle according to claim 14, wherein the rib faces the sensor in the image forming apparatus during rotation of the toner bottle.

18. (Pending) An image forming apparatus in combination with the toner bottle according to claim 14, the image forming apparatus comprising:

a motor for rotating the toner bottle;

a motor driver for driving the motor;

a sensor for sensing the rib of the toner bottle and outputting a sensor signal; and
a CPU that controls the motor driver and discriminates the toner bottle using the
sensor signal,

wherein the CPU rotates the toner bottle by controlling the motor driver, senses the rib
using the sensor, outputs information indicating abnormality if the rib is not sensed by the
sensor,

checks, if the rib is sensed, whether the rib has the predetermined ratio on the outer
surface of the bottle body, outputs information indicating abnormality if the rib does not
extend for the predetermined ratio, and outputs information indicating normality if the rib
extends for the predetermined ratio.

19. (Pending) The image forming apparatus in combination with the toner bottle
according to claim 18,

wherein in order to check whether the rib extends for the predetermined ratio on the
outer surface of the bottle body,

the CPU detects a first time interval that is based on when the sensor senses a first rib
end portion of the rib during toner bottle rotation to when the sensor senses a second rib end
portion,

detects a second time interval that is based on when the sensor senses the second rib
end portion of the rib during toner bottle rotation to when the sensor senses the first rib end
portion, and

checks whether the rib extends for the predetermined ratio on the outer surface of the
bottle body based on the first and second time intervals.

20. (Pending) The image forming apparatus in combination with the toner bottle
according to claim 18, wherein the CPU controls the motor driver to stop rotation of the toner
bottle when the sensor finishes sensing the rib.

Cancel claim 21.

Cancel claim 22.

Cancel claim 23.

Cancel claim 24.

Cancel claim 25.

Cancel claim 26.

Cancel claim 27.

Cancel claim 28.

Cancel claim 29.

Cancel claim 30.

Cancel claim 31.

Cancel claim 32.

Cancel claim 33.

Cancel claim 34.

35. (Currently Amended) A method of discriminating toner bottle types, comprising the steps of:

providing a toner bottle, the toner bottle comprising:

an elongated cylindrical body portion having an outer surface,

at least one groove extending around the outer surface of the cylindrical body portion,

a first end portion at a first end of the cylindrical body portion,

a second end portion at a second end of the cylindrical body portion opposite the first end portion in an axial direction along the cylindrical body portion,

a toner discharge port positioned at the first end portion, and

a rib formed on an outer surface of the toner bottle;

rotating the toner bottle in an image forming apparatus;

sensing, using a sensor in the image forming apparatus, the rib while rotating the toner bottle and, if the rib is not sensed, outputting information indicating abnormality; and

discriminating toner bottle type by checking, if the rib is sensed, whether the rib extends for a predetermined ratio on the outer surface of the toner bottle, outputting information indicating abnormality if the rib does not extend for the predetermined ratio, and outputting information indicating normality if the rib extends for predetermined ratio.

Cancel claim 36.

37. (Pending) The method of claim 35, wherein the step of discriminating toner bottle type comprises:

detecting, during the step of rotating the toner bottle, a first time interval that is based on when the sensor senses a first rib end portion of the rib to when the sensor senses a second rib end portion,

detecting, during the step of rotating the toner bottle, a second time interval that is based on when the sensor senses the second rib end portion of the rib to when the sensor senses the first rib end portion, and

checking whether the rib extends for the predetermined ratio on the outer surface of the toner bottle based on the first and second time intervals.

38. (Pending) The method of claim 35, wherein the rib is positioned at a predetermined position on the toner bottle relative to the toner discharge port, and the rib is axially aligned with the toner discharge port in a direction along the cylindrical body portion.

39. (Pending) The method of claim 35, wherein the rib extends circumferentially for a predetermined angle relative to the outer surface of the cylindrical body portion.

Cancel claim 40.

Cancel claim 41.

Cancel claim 42.

Cancel claim 43.

Cancel claim 44.

45. (Pending) The toner bottle of claim 6, wherein the toner bottle further comprises:
an elongated cylindrical body portion having an outer surface;
at least one groove extending around the outer surface of the cylindrical body portion;
a first end portion at a first end of the cylindrical body portion;
a second end portion at a second end of the cylindrical body portion opposite the first end portion in an axial direction along the cylindrical body portion; and
a toner discharge port positioned at the first end portion,
wherein the object is formed at the second end portion.

46. (Pending) The toner bottle of claim 45, wherein the object is a rib.

47. (Pending) The toner bottle of claim 46, wherein the rib is formed at a predetermined position on the toner bottle relative to the toner discharge port.

48. (Pending) The toner bottle of claim 47, wherein the toner discharge port is aligned with the rib in an axial direction along the cylindrical body portion.

49. (Pending) The toner bottle of claim 48, wherein the first end portion has a diameter smaller than a diameter of the cylindrical body portion.

50. (Pending) The toner bottle of claim 46, wherein the groove is a spiral groove that extends from adjacent the second end portion to adjacent the first end portion.

51. (Pending) The toner bottle of claim 50, wherein the spiral groove extends continuously without breaks from adjacent the second end portion to adjacent the first end portion.

52. (Pending) The toner bottle of claim 51, wherein the continuous spiral groove comprises a plurality of groove portions that extend parallel to one another in a direction circumferentially along the outer surface of the cylindrical body portion.

53. (Pending) The toner bottle of claim 52, wherein the plurality of groove portions comprises a first groove portion, a second groove portion, and a third groove portion, wherein a first distance between the first groove portion and the second groove portion is equal to a second distance between the second groove portion and the third groove portion.

54. (Pending) The toner bottle of claim 53, wherein the toner discharge port is positioned on an outer circumferential surface of the first end portion.